

Structural and Reinforcing Iron and Metal Workers

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Significant Points

- Most employers recommend a 3- or 4-year apprenticeship.
- During economic downturns, workers can experience high rates of unemployment.
- The danger of injuries due to falls is high; those who work at great heights do not work during wet, icy, or extremely windy conditions.

Nature of the Work

Structural and reinforcing iron and metal workers place and install iron or steel girders, columns, and other construction materials to form buildings, bridges, and other structures. They also position and secure steel bars or mesh in concrete forms in order to reinforce the concrete used in highways, buildings, bridges, tunnels, and other structures. In addition, they repair and renovate older buildings and structures. Even though the primary metal involved in this work is steel, these workers often are known as *ironworkers*.

Before construction can begin, ironworkers must erect steel frames and assemble the cranes and derricks that move structural steel, reinforcing bars, buckets of concrete, lumber, and other materials and equipment around the construction site. Once this job has been completed, workers begin to connect steel columns, beams, and girders according to blueprints and instructions from supervisors and superintendents. Structural steel, reinforcing rods, and ornamental iron generally come to the construction site ready for erection—cut to the proper size, with holes drilled for bolts and numbered for assembly.

Ironworkers at the construction site unload and stack the prefabricated steel so that it can be hoisted easily when needed. To hoist the steel, ironworkers attach cables (slings) to the steel and to the crane or derrick. One worker directs the hoist operator with hand signals while another worker holds a rope (tag line) attached to the steel to prevent it from swinging. The crane or derrick hoists steel into place in the framework, whereupon several ironworkers position the steel with connecting bars and jacks. Workers using driftpins or the handle of a spud wrench—a long wrench with a pointed handle—align the holes in the steel with the holes in the framework. Before the bolts are permanently tightened, ironworkers check vertical and horizontal alignment with plumb bobs, laser equipment, transits, or levels; then they bolt or weld the piece permanently in place.

Reinforcing iron and rebar workers set reinforcing bars (often called rebar) in the forms that hold concrete, following blueprints showing the location, size, and number of bars. They then fasten the bars together by tying wire around them with pliers. When reinforcing floors, ironworkers place spacers under the rebar to hold the bars off the deck. Although these materials usually arrive ready to use, ironworkers occasionally must cut bars with metal shears or acetylene torches, bend them by hand or machine, or weld them with arc-welding equipment. Some concrete is reinforced with welded wire fabric. Using hooked rods, workers cut and fit the fabric, and while a concrete crew places the concrete, ironworkers properly position the fabric into the concrete. Posttensioning is another technique used in reinforcing concrete. In this technique, workers substitute cables for reinforcing bars. When the concrete is poured,

the ends of the cables are left exposed. After the concrete cures, ironworkers tighten the cables with jacking equipment specially designed for the purpose. Posttensioning allows designers to create larger open areas in a building, because supports can be placed further apart. This technique is commonly employed in parking garages and arenas.

Ornamental ironworkers install elevator shafts, stairs, curtain walls (the nonstructural walls and window frames of many large buildings), and other ornamentation after the structure of the building has been completed. As they hoist pieces into position, ornamental ironworkers make sure that the pieces are properly fitted and aligned before bolting, brazing, or welding them for a secure fit.

Working Conditions

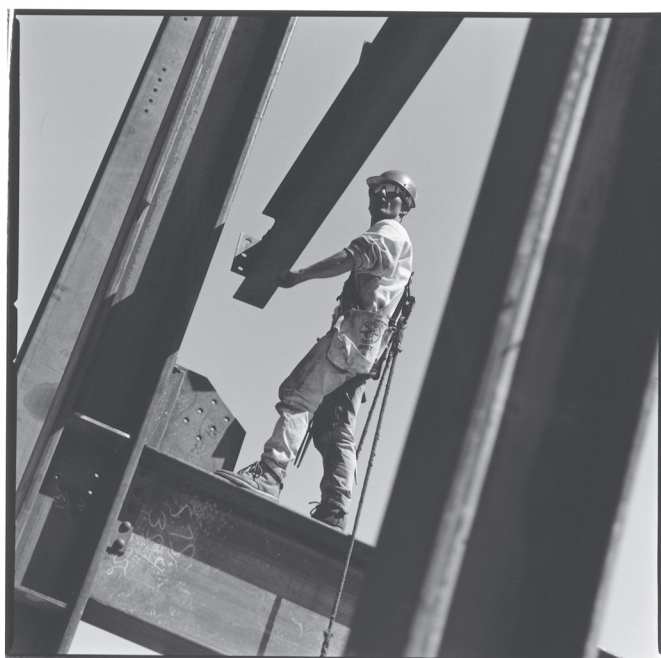
Structural and reinforcing iron and metal workers usually work outside in all kinds of weather. However, those who work at great heights do not work during wet, icy, or extremely windy conditions. Because the danger of injuries due to falls is great, ironworkers use safety devices such as safety belts, scaffolding, and nets to reduce risk.

Some ironworkers fabricate structural metal in fabricating shops, which usually are located away from the construction site. These workers are covered in the statement on assemblers and fabricators found elsewhere in the *Handbook*.

Employment

Structural and reinforcing iron and metal workers held about 107,000 jobs in 2002. Around 4 out of 5 worked in construction, with nearly half working for foundation, structure, and building exterior contractors. Most of the remaining ironworkers worked for contractors specializing in the construction of homes; factories; commercial buildings; religious structures; schools; bridges and tunnels; and water, sewer, communications, and power lines.

Structural and reinforcing iron and metal workers are employed in all parts of the country, but most work in metropolitan areas, where the bulk of commercial and industrial construction takes place.



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Training, Other Qualifications, and Advancement

Most employers recommend a 3- or 4-year apprenticeship consisting of on-the-job training and evening classroom instruction as the best way to learn this trade. Apprenticeship programs usually are administered by committees made up of representatives of local unions of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers or the local chapters of contractors' associations.

Ironworkers must be at least 18 years old. A high school diploma is preferred by employers and local apprenticeship committees. High school courses in general mathematics, mechanical drawing, and shop are helpful. Because materials used in iron working are heavy and bulky, ironworkers must be in good physical condition. They also need good agility, balance, eyesight, and depth perception to work safely at great heights on narrow beams and girders. Ironworkers should not be afraid of heights or suffer from dizziness.

In the classroom, apprentices study blueprint reading; mathematics for layout work; the basics of structural erecting, rigging, reinforcing, welding, and burning; ornamental erection; and assembling. Apprentices also study the care and safe use of tools and materials. On the job, apprentices work in all aspects of the trade, such as unloading and storing materials at the job site, rigging materials for movement by crane, connecting structural steel, and welding.

Some ironworkers learn the trade informally on the job, without completing an apprenticeship. These workers generally do not receive classroom training, although some large contractors have extensive training programs. On-the-job trainees usually begin by assisting experienced ironworkers on simple jobs, such as carrying various materials. With experience, trainees perform more difficult tasks, such as cutting and fitting different parts; however, learning through work experience alone may not provide training as complete as an apprenticeship program, and it usually takes longer.

Some experienced workers are promoted to supervisor. Others may go into the contracting business for themselves.

Job Outlook

Employment of structural and reinforcing iron and metal workers is expected to rise about as fast as the average for all occupations through the year 2012, largely on the basis of continued growth in industrial and commercial construction. The rehabilitation, maintenance, and replacement of a growing number of older buildings, factories, powerplants, highways, and bridges is expected to create employment opportunities. In addition to new jobs that arise, other job openings will result from the need to replace experienced ironworkers who transfer to other occupations or leave the labor force.

The number of job openings fluctuates from year to year with economic conditions and the level of construction activity. During economic downturns, ironworkers can experience high rates of unemployment. Similarly, job opportunities for ironworkers may vary widely by geographic area. Job openings for ironworkers usually are more abundant during the spring and summer months, when the level of construction activity increases.

Earnings

In 2002, median hourly earnings of structural iron and steel workers in all industries were \$19.55. The middle 50 percent earned between \$14.45 and \$26.00. The lowest 10 percent earned less than \$10.81, and the highest 10 percent earned more than \$31.81. In 2002, median hourly earnings of reinforcing iron and rebar workers in all industries were \$17.66. The middle 50 percent earned between \$12.72 and \$25.74. The lowest 10 percent earned less than \$10.07, and the highest 10 percent earned more than \$31.40.

Median hourly earnings of structural iron and steel workers in 2002 in foundation, structure, and building exterior contractors were \$21.35 and in nonresidential building construction, \$16.98. Reinforcing iron and rebar workers earned median hourly earnings of \$18.46 in foundation, structure, and building exterior contractors in 2002.

Many workers in this trade are members of the International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers. According to the union, average hourly earnings, including benefits, for structural and reinforcing metal workers who belonged to a union and worked full time were 34 percent higher than the hourly earnings of nonunion workers. Structural and reinforcing iron and metal workers in New York, Boston, San Francisco, Chicago, Los Angeles, Philadelphia, and other large cities received the highest wages.

Apprentices generally start at about 50 percent to 60 percent of the rate paid to experienced journey workers. Throughout the course of the apprenticeship program, as they acquire the skills of the trade, they receive periodic increases until their pay approaches that of experienced workers.

Earnings for ironworkers may be reduced on occasion because work can be limited by bad weather, the short-term nature of construction jobs, and economic downturns.

Related Occupations

Structural and reinforcing iron and metal workers play an essential role in erecting buildings, bridges, highways, power lines, and other structures. Others who work on these construction jobs include assemblers and fabricators; boilermakers; civil engineers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; construction managers; and welding, soldering, and brazing workers.

Sources of Additional Information

For more information on apprenticeships or other work opportunities, contact local general contractors; a local of the International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers Union; a local ironworkers' joint union-management apprenticeship committee; a local or State chapter of the Associated Builders and Contractors or the Associated General Contractors; or the nearest office of your State employment service or apprenticeship agency.

For apprenticeship information, contact

► International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers, Apprenticeship Department, 1750 New York Ave. NW., Suite 400, Washington, DC 20006.

For general information about ironworkers, contact either of the following sources:

► Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

► Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: <http://www.agc.org>

More than 500 occupations are registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check the Department's website: <http://www.doleta.gov>